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(54) Transmitter and two-way radio set

(57) A transmitter and a two-way radio set which can be made structurally much simpler and also which can reduce consumption current. A carrier S10 is obtained by frequency-dividing an oscillation signal generated by an oscillator 50, and the first local signal S12 and the second local signal S14 are obtained on the basis of the oscillation signal generated by the oscillator 50. Therefore, the construction can be made simple as compared with the conventional system, and consumption current can be reduced.

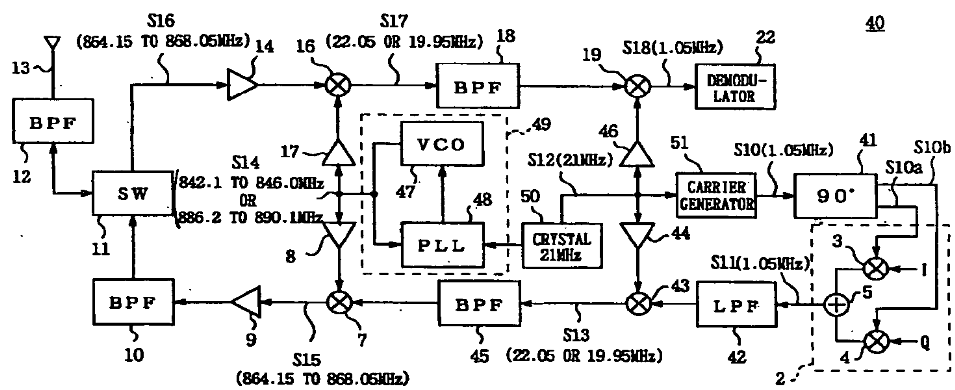


FIG. 2

Description

The present invention relates to a transmitter and a two-way radio set and is applicable, for example, to a digital cordless telephone set.

In some conventional digital cordless telephone sets, radio circuits are connected to make a call by TDD/FDMA (time division duplex/frequency division multiple access) system or TDD/TDMA (time division duplex/time division multiple access) system.

For example, in TDD/FDMA system digital cordless telephone sets, there is a representative digital cordless telephone set called CT-2, where the technical standards have been published by ETSI (European Telecommunication Standard Institute).

In the above digital cordless telephone set, the frequency band (864.15 to 868.05 [MHz]) used is frequency-divided at intervals of 100 [KHz] to ensure a plurality of communication channels, and also on a single communication channel, transmission and reception are alternately switched in time to perform communications. If, for example, data to be transmitted and received is voice data, transmission and reception will be alternately switched every 1 [ms]. In this case, a guard band of 3.5 [bit] is set between transmission and reception by standards to avoid the interference between transmission and reception.

Also, in the above digital cordless telephone set, ADPCM (adaptive differential pulse code modulation) based upon CCITT (Consultative Committee for International Telegraph and Telephone) has been used as a voice coding method, and band-limited frequency deviation modulation (for example, GMSK (Gaussian filtered minimum shift keying) is a typical example) has been used as a data modulating method.

Now, the above digital cordless telephone set is constructed, for example, by a circuit such as that shown in Fig. 1. As shown in Fig. 1, an orthogonal modulator 2 is provided in a digital cordless telephone set 1, by which GMSK-modulates transmission data. The orthogonal modulator 2 is constituted by mixers 3, 4 and an adder 5. Band-limited signals I and Q which correspond to transmission data, and carriers S1a and S1b of 150.05 [MHz] are input to the orthogonal modulator 2. The mixer 3 multiplies the I-signal and the carrier S1a and outputs the resultant signal to the adder 5. Likewise, the mixer 4 multiplies the Q-signal and the carrier S1b and outputs the resultant signal to the adder 5. The adder 5 adds the outputs of the mixers 3 and 4. In this way, the GMSK-modulated modulation signal S2 of 150.05 [MHz] is output from the orthogonal modulator 2. In this case, a phase shifter 6 is provided for generating carriers S1a and S1b each having a phase difference of 90° from a carrier S1 of 150.05 [MHz].

The modulation signal S2 is input to a mixer 7, in which the modulation signal is frequency-converted to a transmission signal S4 of 864.15 to 868.05 [MHz] (i.e., converted to a higher frequency) by means of a first local signal S3 of 714.1 to 718.0 [MHz] or 1014.2 to 1018.1 [MHz] which is supplied through a buffer 8. The transmission signal S4 is input through a transmission amplifier 9 to a BPF (band pass filter) 10, in which the unnecessary component is removed. After passing through a switch 11 and a BPF 12, the signal S4 is finally output from an antenna 13.

On the other hand, a receiving signal S5 received at the antenna 13 is input through the BPF 12, the switch 11, and a receiving amplifier 14 to a LPF (low pass filer) 15, in which unnecessary components are removed. Thereafter, the signal S5 is input to a mixer 16. The mixer 16 frequency-converts the receiving signal S5 to an intermediate frequency signal S6 of 150.05 [MHz] (i.e., converted to a lower frequency) making use of the first local signal S3 of 714.1 to 718.0 [MHz] or 1014.2 to 1018.1 [MHz] supplied through a buffer 17. The intermediate frequency signal S6 is output through a BPF 18 to a mixer 19. The mixer 19 frequency-converts the intermediate frequency signal S6 to a modulation signal S8 of 10.05 [MHz] by means of a second local signal S7 of 140 [MHz] generated by a crystal oscillator 20 of 28 [MHz] and a quintuple circuit 21, and then outputs the modulation signal S8 to a demodulator 22. Thus, the demodulator 22 demodulates data by demodulating the GMSK-modulated modulation signal S8.

The first local signal S3 described above is generated by a channel synthesizer 25 composed of a VCO (voltage-controlled oscillator) 23 and a PLL (phase-locked loop) 24. In this case, the channel synthesizer 25 generates the first local signal S3 based on a signal of 12.8 [MHz] output from a crystal oscillator 26.

Also, the carrier S1 described above is generated by frequency-dividing an oscillation signal S9 of 300.1 [MHz] generated by a synthesizer 29 composed of a VCO 27 and a PLL 28 by two. In this case, the synthesizer 29 generates the oscillation signal S9 of 300.1 [MHz] by means of the crystal oscillator 26.

As shown in Fig. 1, since the digital cordless telephone set 1 has a plurality of crystal oscillators 20, 26, a plurality of VCOs 23, 27, and a plurality of PLLs 24, 28, there arises the problems that its circuit is structurally complicated and its consumption current is increased. Further, if the circuit is thus structurally complicated, the areas of the parts become larger and therefore also there occurs the problem that the integration of the circuit is very difficult.

In view of the foregoing, an object of this invention is to provide a transmitter and a two-way radio set which can be made structurally much simpler and also can reduce consumption current.

The foregoing object and other objects of the invention have been achieved by the provision of a transmitter of the present invention, comprising: an oscillator for generating an oscillation signal of predetermined frequency; a frequency divider for frequency-dividing the oscillation signal to generate a carrier of predetermined frequency; an orthogonal modulator for orthogonally modulating predetermined transmission data on the basis of the carrier; a first frequency

converter for frequency-converting a modulation signal output form the orthogonal modulator into an intermediate-frequency signal of predetermined frequency by means of a first local signal based on the oscillation signal; a synthesizer for generating a second local signal of desired frequency on the basis of the oscillation signal; and a second frequency converter for frequency-converting the intermediate-frequency signal to a transmission signal of desired frequency by means of the second local signal.

Further, the present invention provides a two-way radio set, comprising: an oscillator for generating an oscillation signal of predetermined frequency; a frequency divider for frequency-dividing the oscillation signal to generate a carrier of predetermined frequency; an orthogonal modulator for orthogonally modulating predetermined transmission data on the basis of the carrier; a first frequency converter for frequency-converting a modulation signal output form the orthogonal modulator into an intermediate-frequency signal of predetermined frequency by means of a first local signal based on the oscillation signal; a synthesizer for generating a second local signal of desired frequency on the basis of the oscillation signal; a second frequency converter for frequency-converting the intermediate-frequency signal to a transmission signal of desired frequency by means of the second local signal; and a receiving circuit for converting a received receiving signal to a signal of predetermined frequency by means of the second local signal to demodulate the receiving signal.

In the transmitter or two-way radio set, the carrier is obtained by frequency-dividing the oscillation signal generated by the oscillator, and the first and second local signals are obtained on the basis of the oscillation signal generated by the oscillator, so that the structure can be made simple as compared to conventional structure, and consumption current can be reduced.

The present invention will be more clearly understood from the following description, given by way of example only, with reference to the accompanying drawings in which:

Fig. 1 is a block diagram showing the structure of a conventional digital cordless telephone set;
Fig. 2 is a block diagram showing the structure of a digital cordless telephone set according to an embodiment of the present invention;
Fig. 3 is a block diagram showing the structure of a carrier generator and a phase shifter; and
Fig. 4 is a block diagram showing the structure of a digital cordless telephone set according to another embodiment.

In Fig. 2 where the same reference numerals are applied to corresponding parts with Fig. 1, 40 designates a CT-2 system digital cordless telephone set, in which an orthogonal modulator 2 modulates transmission data by GMSK same as the conventional system. In this embodiment, carriers S10a and S10b of 1.05 [MHz] are input to the orthogonal modulator 2, which generates a GMSK-modulated modulation signal S11 of 1.05 [MHz] from the carriers S10a, S10b, an I-signal and a Q-signal. Note that a phase shifter 41 is provided for generating carriers S10a and S10b each having a phase difference of 90° from a carrier S10 of 1.05 [MHz].

The modulation signal S11 is input to a simple primary or quadratic LPF (low pass filter) 42, in which the unnecessary component is removed. Thereafter, the modulation signal S11 is input to a mixer 43. The mixer 43 frequency-converts the modulation signal S11 to an intermediate-frequency signal S13 of 22.05 or 19.95 [MHz] (i.e., converted to a higher frequency) by means of a second local signal S12 of 21 [MHz] which is supplied via a buffer 44. The intermediate-frequency signal S13 is input to a BPF (band pass filter) 45, in which the unnecessary component is removed. Thereafter, the intermediate-frequency signal S13 is input to a mixer 7. The mixer 7 frequency-converts the intermediate-frequency signal S13 to a transmission signal S15 of 864.15 to 868.05 [MHz] by means of a first local signal S14 of 842.1 to 846.0 [MHz] or 886.2 to 890.1 [MHz] which is supplied via a buffer 8. This transmission signal S15 is input through a transmission amplifier 9 to a band pass filter 10, in which the unnecessary component out of the band region is removed. Thereafter, the transmission signal S15 is passed through a switch 11 and a BPF 12, and finally is transmitted from an antenna 13.

On the other hand, a receiving signal S16 received at the antenna 13 is input through the BPF 12 and the switch 11 to a receiving amplifier 14, which amplifies the receiving signal S16. Thereafter, the amplified signal S16 is input to a mixer 16. The mixer 16 frequency-converts the receiving signal S16 to an intermediate-frequency signal S17 of 22.05 or 19.95 [MHz] (i.e., converted to a lower frequency) by means of the first local signal S14 of 842.1 to 846.0 [MHz] or 886.2 to 890.1 [MHz] which is supplied through a buffer 17. The intermediate-frequency signal S17 is input to a BPF 18, in which the unnecessary component is removed. Thereafter, the intermediate-frequency signal S17 is input to a mixer 19. The mixer 19 frequency-converts the intermediate-frequency signal S17 to a modulation signal S18 of 1.05 [MHz] by a second local signal S12 of 21 [MHz] which is supplied through a buffer 46, and then outputs the modulation signal S18 to a demodulator 22 of the following stage. The demodulator 22 demodulates the modulation signal S18 by quadrature wave detection to demodulate data.

Incidentally, the buffers 8, 17, 44, and 46 are provided in order that the impedance variation at the time of the burst operation does not have an influence on a signal generation source.

The aforementioned first local signal S14 is generated by a channel synthesizer 49 composed of a VCO (voltage-controlled oscillator) 47 and a PLL (phase-locked loop) 48. In this case, the channel synthesizer 49 generates the first

local signal S14 of 842.1 to 846.0 [MHz] or 886.2 to 890.1 [MHz] based on the oscillation signal of 21 [MHz] generated by a crystal oscillator 50 for reference.

Also, the oscillation signal of 21 [MHz] generated by the crystal oscillator 50 is used as the aforementioned second local signal S12. In addition, the aforementioned carrier S10 is generated by a carrier generator 51. In this case, the carrier generator 51 generates the carrier S10 of 1.05 [MHz] based on the second local signal S12 of 21 [MHz] generated by the crystal oscillator 50.

Thus, the first local signal S14, the second local signal S12, and the carrier S10 are generated based on the oscillation signal of 21 [MHz] generated by the crystal oscillator 50.

The carrier generator 51 and the phase shifter 41 are constituted by a circuit shown in Fig. 3. The carrier generator 51 is composed of a frequency divider constituted with a counter, as shown in Fig. 3, and generates the carrier S10 of 1.05 [MHz] by frequency-dividing the second local signal S12 of 21 [MHz] by twenty. The carrier generator 51 also generates clock signals S19 and S20 of 2.1 [MHz] by frequency-dividing the second local signal S12 by ten, and then outputs the clock signal S19 to a delay flip-flop (hereinafter referred to as a "D-FF") 52 of the phase shifter 41 and also outputs the clock signal S20 to an inverter 53 of the phase shifter 41. The inverter 53 inverts the clock signal S20 and outputs the resultant clock signal S21 to a D-FF 54.

The D-FF 52 latches the carrier S10 based on the clock signal S19, for example, the rise edge thereof, and outputs the latched output via a low pass filter 55. As a result, the carrier S10a is output from the low pass filter 55. On the other hand, the D-FF 54 latches the carrier S10 based on the clock signal S21, for example, the rise edge thereof, and outputs the latched output via a low pass filter 56. As a result, the carrier S10b is output from the low pass filter 56.

Note that, although the low pass filters 55 and 56 are provided in the phase shifter 41 for removing the higher harmonic components of the carriers S10a and S10b, there are some cases where the filters 55 and 56 are unnecessary depending upon a modulating method, and thus they are not always needed.

In this case, the frequency of each of the clock signals S19 and S21 is double the frequency of the carrier S10 and also the clock signals S19 and S21 are inverted with each other, so that the phase difference between the clock signals S19 and S21 is just 90° considering the carrier S10 as a reference. Therefore, the phase difference between the carrier S10a output from the D-FF 52 and the carrier S10b output from the D-FF 54 becomes 90° as well. In this way, the carriers S10a and S10b each having a phase difference of 90° are output from the phase shifter 41.

Now, a description will hereinafter be made of the frequency relationship among the signals. First, it is assumed that the oscillating frequency of the crystal oscillator 50 (i.e., frequency of the second local signal S12) is f_1, the frequency of the carrier S10 is f_2, the frequency of the intermediate-frequency signal S13 is f_3, the frequency of the first local signal S14 is f_4, and the frequency of the transmission signal S15 is f_5.

The frequency interval between communication channels is 100 [KHz] in the CT-2 method. Therefore, in the aforementioned structure, it is desirable that the oscillating frequency f_1 of the crystal oscillator 50 which becomes a reference clock of the apparatus is made to be integral times of 100 [KHz]. Also, as a high-frequency circuit, it is desirable that the oscillating frequency f_1 is not multiplied, if possible. In addition, rendering the oscillating frequency f_1 divisible by an integer is desirable in order to realize the frequency divider (carrier generator 51) and the phase shifter 41 for generating the carrier S10. Furthermore, it is desirable that the oscillating frequency f_1 is made to be 25 [MHz] or less to constitute the channel synthesizer 49.

Moreover, considering that it is desirable that the transmission signal S15 is obtained by mixing the first local signal S14 and the intermediate-frequency signal S13, and, by standards, the frequency f_5 of the transmission signal S15 becomes the following equation:

$$f_5 = 864.05 + (N \times 0.1) \text{ [MHz]} : N = 1 \text{ to } 40 \tag{1}$$

and that the frequency f_4 of the first local signal S14 assume the maximum reference frequency 100 [KHz], the frequency f_4 of the first local signal S14 becomes integer times of 100 [KHz], and the frequency f_3 of the intermediate-frequency signal S13 becomes odd number times of 50 [KHz]. That is, considering these facts, the following equations are established between the frequencies f_1, f_2, f_3, f_4, and f_5:

$$f_1 = m \times 100 \text{ [KHz]} : \text{"m" is an integer} \tag{2}$$

$$f_2 = f_1 \times 1/n : \text{"n" is an integer} \tag{3}$$

$$f_4 = x \times 100 \text{ [KHz]} : \text{"x" is an integer} \tag{4}$$

$$f_3 = (2y + 1) \times 50 \text{ [KHz]} : \text{"y" is an integer} \tag{5}$$

$$f_3 = f_1 \pm f_2 \tag{6}$$

$$f_5 = f_4 \pm f_3 \tag{7}$$

For satisfying these frequency relationships, there exist frequencies such as those expressed, for example, by the following equations:

$$f_1 = 21 \text{ [MHz]} \tag{8}$$

$$f_2 = 1.05 \text{ [MHz]} \tag{9}$$

$$f_3 = 22.05 \text{ or } 19.95 \text{ [MHz]} \tag{10}$$

$$f_4 = 842.1 \text{ to } 846.0 \text{ or } 886.2 \text{ to } 890.1 \text{ [MHz]} \tag{11}$$

$$f_5 = 864.15 \text{ to } 868.05 \text{ [MHz]} \tag{12}$$

Therefore, since the digital cordless telephone set 40 of the present invention meets these frequency relationships, the first local signal S14, the second local signal S12, and the carrier S10 can be generated from one single crystal oscillator 50.

With the construction described above, the oscillating frequency f_1 of the crystal oscillator 50 is set to 21 [MHz], and the channel synthesizer 49 generates the first local signal S14 of 842.1 to 846.0 [MHz] or 886.2 to 890.1 [MHz] based on the oscillation signal of 21 [MHz] which is output from the crystal oscillator 50. Also, the oscillation signal of 21 [MHz] output from the crystal oscillator 50 is used as the second local signal S12 as it is, and the carrier S10 of 1.05 [MHz] is generated by frequency-dividing the oscillation signal of 21 [MHz] by twenty.

Then, the transmission data is modulated by GMSK based on the carrier S10 obtained above, and the resultant modulation signal S11 is frequency-converted with the first local signal S14 and the second local signal S12 by means of a double conversion method to obtain a transmission signal S15 having desired frequency (864.15 to 868.05 [MHz]).

Also, the receiving signal S16 of 864.15 to 868.05 [MHz] received by the antenna 13 is frequency-converted with the first local signal S14 and the second local signal S12 by means of a double conversion method to obtain the a modulation signal S18, and the data is demodulated by demodulating the modulation signal S18.

As described above, the channel synthesizer 49 generates the first local signal S14 based on the oscillation signal output from the crystal oscillator 50, the oscillation signal is used as the second local signal S12. Furthermore, the carrier S10 is generated by frequency-dividing the oscillation signal by twenty. Therefore, the overall construction can be made simple as compared to the conventional systems. Also, since the number of circuits such as VCO and PLL is reduced, consumption current can be reduced. In addition, since the number of circuit parts is reduced, cost is reduced and circuit parts can be easily integrated.

In this case, the carrier generator 51 can be constituted with a simple frequency divider and also the phase shifter 41 can be simply constituted with a flip-flop and an inverter. Therefore, the carrier generator 51 or the phase shifter 41 can be easily stopped when a signal is received, and the interference of the carrier S10 to the receiving circuit can be reduced. Furthermore, since the output of the crystal oscillator 50 is used as a second local signal S12 as it is, the influence of the load variation caused by the mixers 19 and 43 can be made small as compared to a case where the second local signal S12 is generated by a VCO, etc.. In addition, since the frequencies of the intermediate-frequency signals S13 and S17 are rendered smaller than ever, the BPFs 18 and 45 do not have to be constituted with SAW filters and the construction can be simpler.

According to the foregoing construction, the first local signal S14 is generated based on the oscillation signal output from the crystal oscillator 50, the oscillation signal is employed as the second local signal S12, and furthermore the carrier S10 is generated by frequency-dividing the oscillation signal. Therefore, the construction can be made much simpler and consumption current can be reduced.

In the embodiment described above, the oscillating frequency f_1 of the crystal oscillator 50, the frequency f_2 of the carrier S10, the frequency f_3 of the intermediate-frequency signal S13, the frequency f_4 of the first local signal S14, and the frequency f_5 of the transmission signal S15 are set to the frequencies expressed by the equations (8) to (12). However, the present invention is not only limited to this, but other frequencies can be employed if the frequencies meet the equations (2) to (7). For example, the frequency f_5 of the transmission signal S15 can be set to the same value as indicated by the equation (12), and the oscillating frequency f_1 of the crystal oscillator 50, the frequency f_2 of the carrier S10, the frequency f_3 of the intermediate-frequency signal S13, and the frequency f_4 of the first local signal S14 may be set to the values indicated by the following equations:

$$f_1 = 18.4 \text{ [MHz]} \tag{13}$$

$$f_2 = 1.15 \text{ [MHz]} \tag{14}$$

$$f_3 = 19.55 \text{ or } 17.25 \text{ [MHz]} \tag{15}$$

$$f_4 = 844.6 \text{ to } 848.5 \text{ or } 883.7 \text{ to } 887.6 \text{ [MHz]} \tag{16}$$

Also, in the embodiment described above, the signal receiving system is constituted with a double conversion method. However, the present invention is not only limited to this, but a digital cordless telephone set 60 can be constituted with a single conversion method, as shown in Fig. 4. With this arrangement, the number of mixers and buffers can be reduced and the construction can be made much simpler.

Incidentally, since the conventional circuit (Fig. 1) have the mixer 16 whose output is high such as 150.05 [MHz], demodulation have to be performed by means of a double conversion method. However, as shown in Fig. 4, when the output of the mixer 16 is low, the single conversion method can be enough to demodulate.

In addition, in the embodiment described above, the output of the crystal oscillator 50 is used as a second local signal S12. However, the present invention is not only limited to this, but the second local signal can be obtained by multiplying the output of the crystal oscillator 50.

Furthermore, in the embodiment described above, the use frequency band of the CT-2 system digital cordless telephone set 40 is 864.15 to 868.05 [MHz]. However, the present invention is not only limited to this, but, in the case of some other digital cordless telephone set different in frequency band and system, the same advantages as the foregoing case can be obtained if carriers or local signals are generated by a single oscillator, as described above. Furthermore, the present invention is not only limited to the digital cordless telephone set, but can be widely applicable to transmitters or two-way radio sets in which a signal modulated by a carrier of predetermined frequency is frequency-converted to a signal of predetermined frequency and transmitted.

According to the present invention described above, the carrier is obtained by frequency-dividing the oscillation signal generated by the oscillator, and the first and second local signals are obtained on the basis of the oscillation signal generated by the oscillator, so that the structure can be made simple as compared to conventional structure, and consumption current can be reduced. Therefore, a transmitter and a two-way radio set which can be made structurally much simpler and also which can reduce consumption current can be realized.

While there has been described in connection with the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be aimed, therefore, to cover in the appended claims all such changes and modifications as fall within the true spirit and scope of the invention.

Claims

1. A transmitter, comprising:

   an oscillator (50) for generating an oscillation signal of predetermined frequency;

   a frequency divider for frequency-dividing said oscillation signal to generate a carrier (S10) of predetermined frequency;

   an orthogonal modulator (2) for orthogonally-modulating predetermined transmission data on the base of said carrier (S10);

   a first frequency converter (43) for frequency-converting a modulation signal output from said orthogonal modulator (2) to an intermediate-frequency signal (S13) of predetermined frequency by means of a first local signal (S12) based on said oscillation signal;

   a synthesizer for generating a second local signal (S14) of desired frequency on the basis of said oscillation signal; and

   a second frequency converter (7) for frequency-converting said intermediate-frequency signal (S13) to a transmission signal (S15) of desired frequency by means of said second local signal (S14).

2. The transmitter according to claim 1, wherein

   when the frequency of said oscillation signal is f1, the frequency of said carrier is f2, the frequency of said intermediate-frequency signal is f3, the frequency of said second local signal is f4, and the frequency of said transmission signal is f5, the frequencies of said oscillation signal, said carrier, said intermediate-frequency signal, said second local signal, and said transmission signal are selected so that frequency relationships indicated by the following equations are established:

$$f_1 = m \times 100 \text{ [KHz]} : \text{"m" is an integer}$$

$$f_2 = f_1 \times 1/n : \text{"n" is an integer}$$

$$f_3 = (2y + 1) \times 50 \text{ [KHz]} = f_1 \pm f_2 : \text{"y" is an integer}$$

$$f_4 = x * 100 \text{ [KHz]} : \text{"x" is an integer}$$

$$f_5 = f_4 \pm f_3$$

3. The transmitter according to claim 1 or 2, wherein
said first local signal (S12) is composed of said oscillation signal or a signal obtained by frequency-multiplying said oscillation signal.

4. A two-way radio, comprising:
a transmitter according to claim 1, 2 or 3; and
a receiving circuit for converting a received receiving signal (S16) to a signal (S17) of predetermined frequency by means of said second local signal (S14) to demodulate said receiving signal (S16).

5. The two-way radio according to claim 4, wherein
said receiving circuit frequency-converts again and demodulates said signal (S17) whose frequency has been converted by means of said second local signal (S14), with said first local signal (S12).

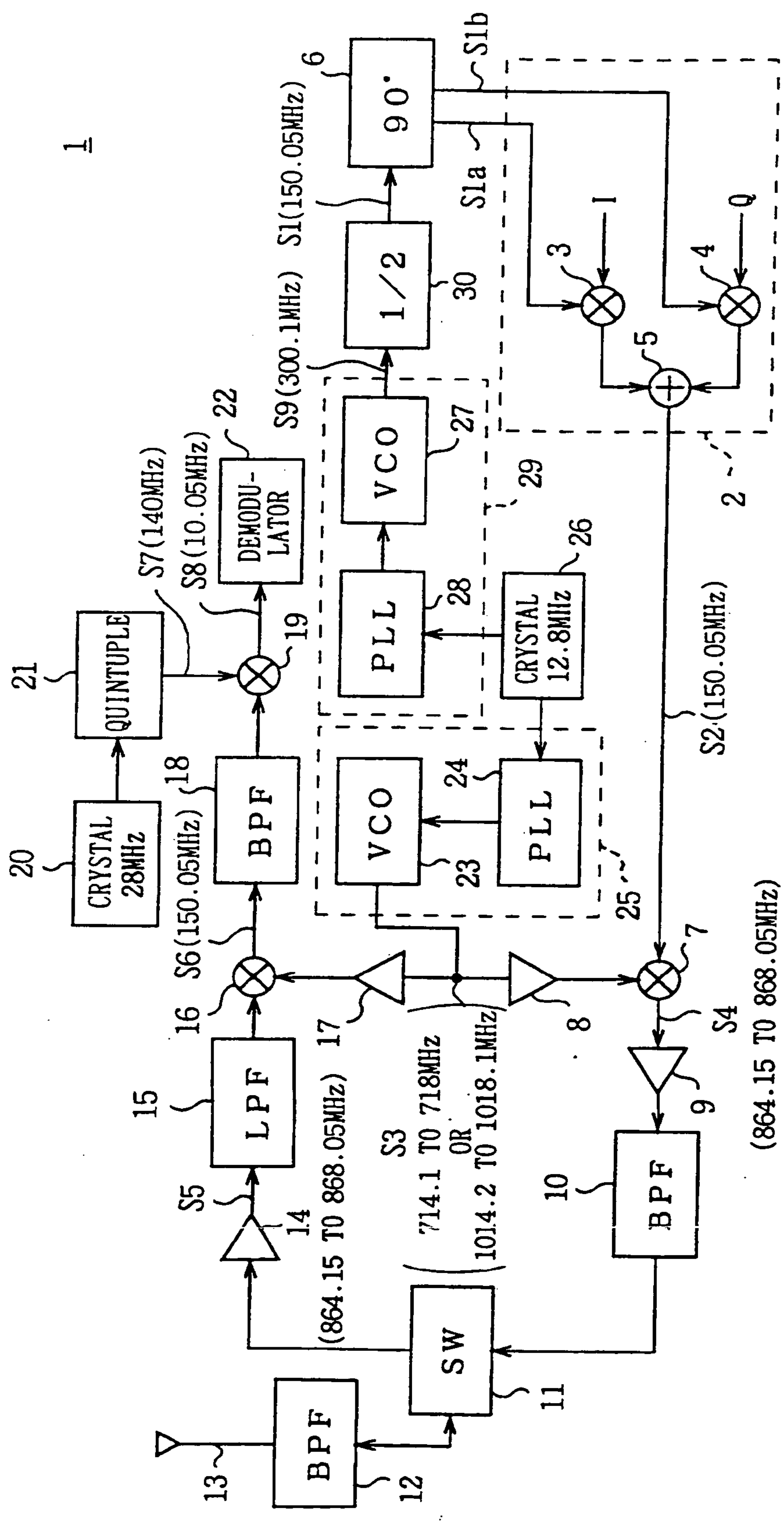


FIG. 1 (RELATED ART)

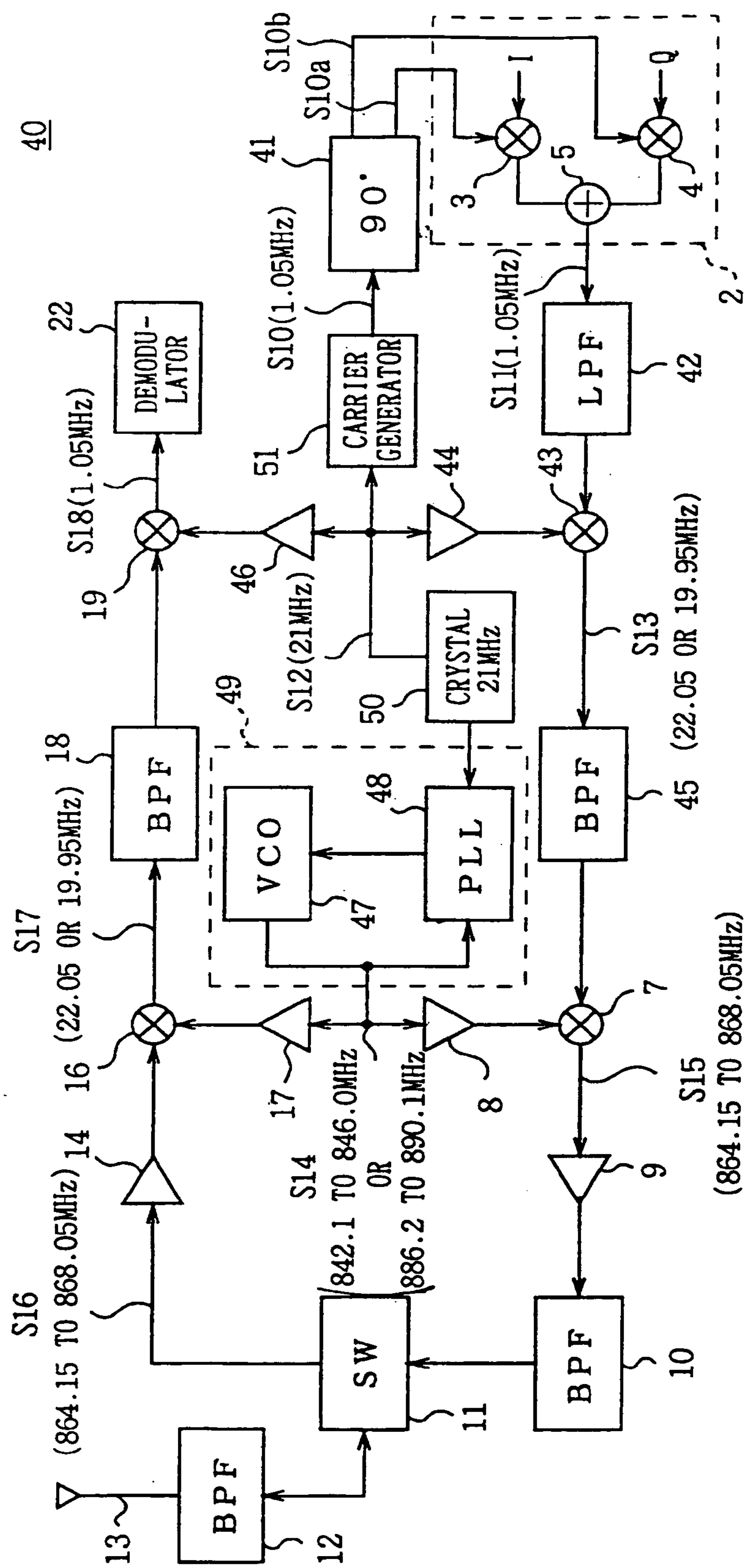

40
BPF
13
12
SW
11
BPF
10
9
S16
(864.15 TO 868.05MHz)
14
16
17
8
S14
842.1 TO 846.0MHz
OR
886.2 TO 890.1MHz
S15
(864.15 TO 868.05MHz)
7
S17
(22.05 OR 19.95MHz)
VCO
47
PLL
48
49
BPF
18
BPF
45
S13
(22.05 OR 19.95MHz)
CRYSTAL
21MHz
50
S12(21MHz)
19
46
44
43
S18(1.05MHz)
DEMODU-
LATOR
22
CARRIER
GENERATOR
51
LPF
42
S11(1.05MHz)
S10(1.05MHz)
90°
41
S10a
S10b
I
Q
3
4
5
2

FIG. 2

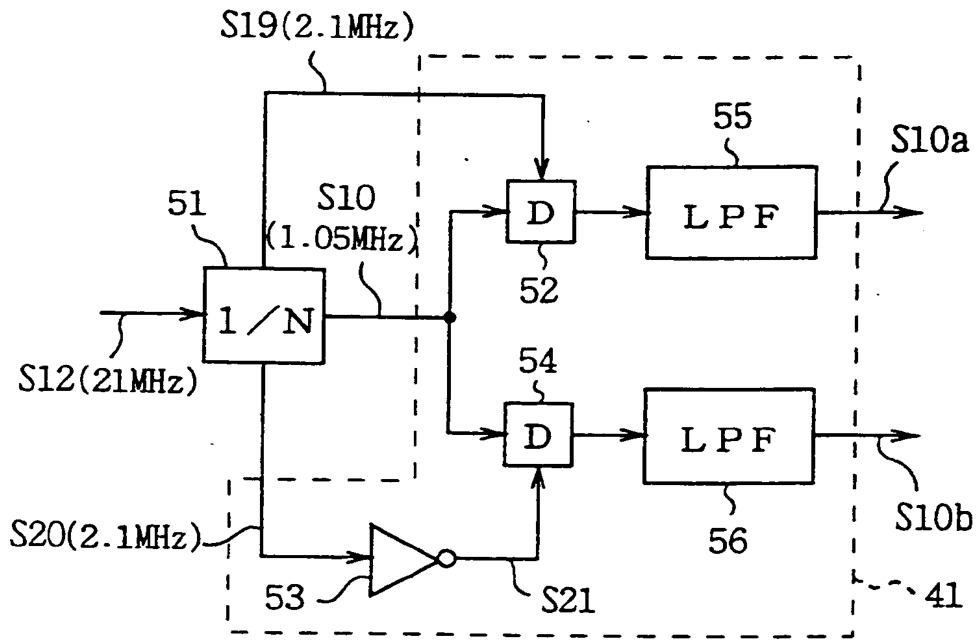
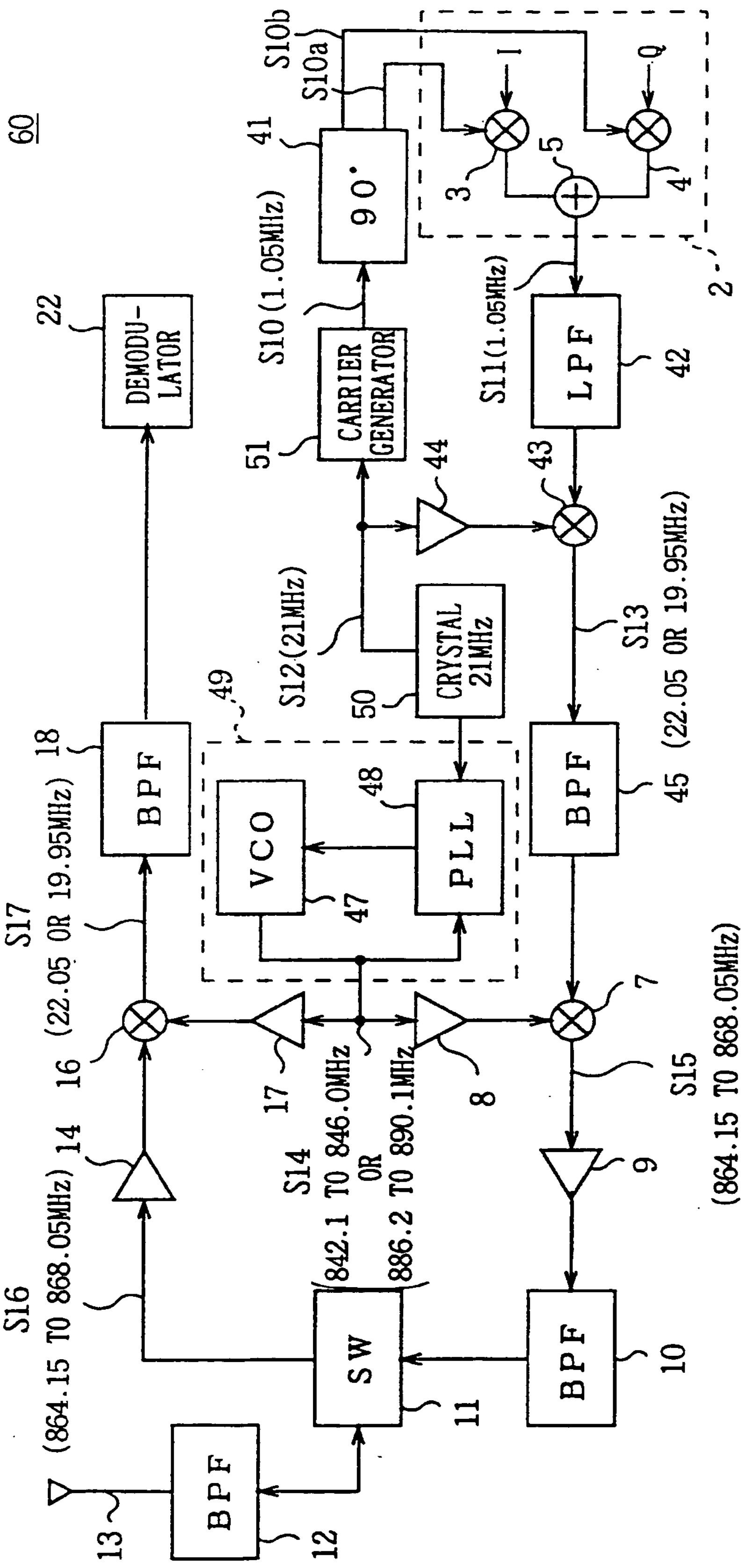

S19(2.1MHz)
55
S10a
51
S10
(1.05MHz)
D
LPF
52
1/N
S12(21MHz)
54
D
LPF
S10b
S20(2.1MHz)
56
53
S21
41

FIG. 3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DEMODU-LATOR
22
CARRIER GENERATOR
51
90°
41
S10(1.05MHz)
S10a
S10b
I
Q
3
4
5
2
S11(1.05MHz)
LPF
42
44
43
S12(21MHz)
CRYSTAL 21MHz
50
S13
(22.05 OR 19.95MHz)
49
BPF
18
VCO
47
PLL
48
BPF
45
S17
(22.05 OR 19.95MHz)
16
17
8
7
S15
(864.15 TO 868.05MHz)
S14
(842.1 TO 846.0MHz
OR
886.2 TO 890.1MHz)
14
9
S16
(864.15 TO 868.05MHz)
SW
11
BPF
10
BPF
12
13

FIG. 4

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(54) Transmitter and two-way radio set

(57) A transmitter and a two-way radio set which can be made structurally much simpler and also which can reduce consumption current. A carrier S10 is obtained by frequency-dividing an oscillation signal generated by an oscillator 50, and the first local signal S12 and the second local signal S14 are obtained on the basis of the oscillation signal generated by the oscillator 50. Therefore, the construction can be made simple as compared with the conventional system, and consumption current can be reduced.

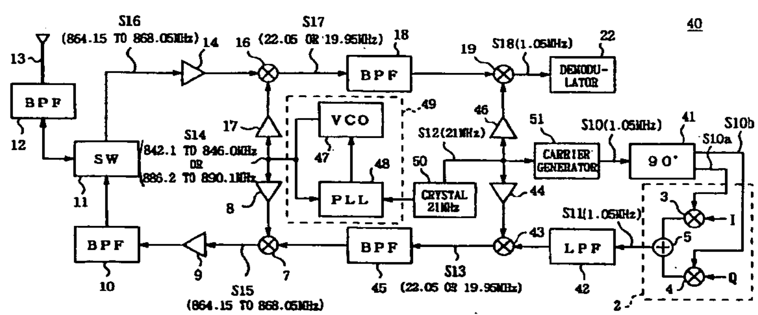

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 95 30 8302

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 4 246 539 A (HARUKI HIROSHI ET AL) 20 January 1981	1,4,5	H04B1/40
A	* column 3, line 28 - line 49; figure 1 * * column 4, line 13 - column 6, line 37; figures 4-8 *	2,3	
A	US 5 163 159 A (RICH RANDALL W ET AL) 10 November 1992 * column 10, line 39 - column 13, line 32; figures 7-9 *	1-5	
A	EP 0 529 767 A (NIPPON ELECTRIC CO) 3 March 1993 * column 2, line 43 - column 3, line 54; figure 1 *	1-5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

H04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	31 July 1998	Andersen, J.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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